

DATA SHEET

NEC

NPN SILICON RF TWIN TRANSISTOR

μPA828TD

NPN SILICON RF TRANSISTOR (WITH 2 ELEMENTS) IN A 6-PIN LEAD-LESS MINIMOLD (M16, 1208 PKG)

FEATURES

- Built-in low phase distortion transistor suited for OSC applications
 $f_T = 9.0 \text{ GHz TYP.}$, $|S_{21e}|^2 = 7.5 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_c = 10 \text{ mA, } f = 2 \text{ GHz}$
 $NF = 1.3 \text{ dB TYP. @ } V_{CE} = 1 \text{ V, } I_c = 3 \text{ mA, } f = 2 \text{ GHz}$
- Built-in 2 transistors (2 × 2SC5436)
- 6-pin lead-less minimold (M16, 1208 PKG)

BUILT-IN TRANSISTORS

	Q1, Q2
3-pin thin-type ultra super minimold part No.	2SC5436

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ORDERING INFORMATION

Part Number	Order Number	Package	Quantity	Supplying Form
μPA828TD	μPA828TD-A	6-pin lead-less minimold (M16, 1208 PKG) (Pb-Free)	50 pcs (Non reel)	• 8 mm wide embossed taping • Pin 1 (Q1 Collector), Pin 6 (Q1 Base) face the perforation side of the tape
μPA828TD-T3	μPA828TD-T3-A		10 kpcs/reel	

Remark To order evaluation samples, contact your nearby sales office.
The unit sample quantity is 50 pcs.

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

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ABSOLUTE MAXIMUM RATINGS (TA = +25°C)

Parameter	Symbol	Ratings	Unit
Collector to Base Voltage	V _{CB0}	5.0	V
Collector to Emitter Voltage	V _{CEO}	3.0	V
Emitter to Base Voltage	V _{EBO}	2	V
Collector Current	I _c	30	mA
Total Power Dissipation	P _{tot} ^{Note}	90 in 1 element	mW
		180 in 2 elements	
Junction Temperature	T _j	150	°C
Storage Temperature	T _{stg}	-65 to +150	°C

Note Mounted on 1.08 cm² × 1.0 mm (t) glass epoxy PCB

ELECTRICAL CHARACTERISTICS (TA = +25°C)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
DC Characteristics						
Collector Cut-off Current	I _{CB0}	V _{CB} = 5 V, I _E = 0 mA	-	-	100	nA
Emitter Cut-off Current	I _{EBO}	V _{EB} = 1 V, I _C = 0 mA	-	-	100	nA
DC Current Gain	h _{FE} ^{Note 1}	V _{CE} = 2 V, I _C = 20 mA	70	-	140	-
RF Characteristics						
Gain Bandwidth Product (1)	f _T	V _{CE} = 1 V, I _C = 10 mA, f = 2 GHz	7.0	9.0	-	GHz
Gain Bandwidth Product (2)	f _T	V _{CE} = 2 V, I _C = 20 mA, f = 2 GHz	9.0	11.0	-	GHz
Insertion Power Gain (1)	S _{21e} ²	V _{CE} = 1 V, I _C = 10 mA, f = 2 GHz	6.0	7.5	-	dB
Insertion Power Gain (2)	S _{21e} ²	V _{CE} = 2 V, I _C = 20 mA, f = 2 GHz	7.0	8.5	-	dB
Noise Figure (1)	NF	V _{CE} = 1 V, I _C = 3 mA, f = 2 GHz, Z _S = Z _{opt}	-	1.3	2.0	dB
Noise Figure (2)	NF	V _{CE} = 2 V, I _C = 3 mA, f = 2 GHz, Z _S = Z _{opt}	-	1.3	2.0	dB
Reverse Transfer Capacitance	C _{re} ^{Note 2}	V _{CB} = 2 V, I _E = 0 mA, f = 1 MHz	-	0.4	0.8	pF
h _{FE} Ratio	h _{FE1} /h _{FE2}	V _{CE} = 2 V, I _C = 20 mA, h _{FE1} : Smaller value of Q1 and Q2, h _{FE2} : Larger value of Q1 and Q2	0.85	-	-	-

Notes 1. Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

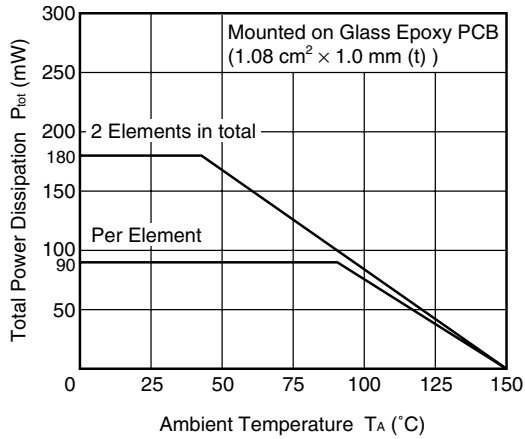
2. Collector to base capacitance when the emitter grounded.

h_{FE} CLASSIFICATION

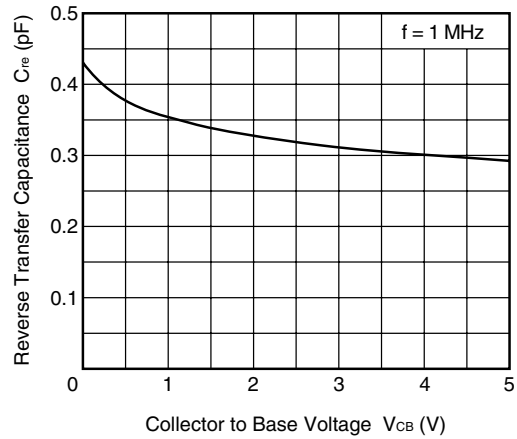
Rank	FB
Marking	kL
h _{FE} Value	70 to 140

<R> TYPICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise specified)

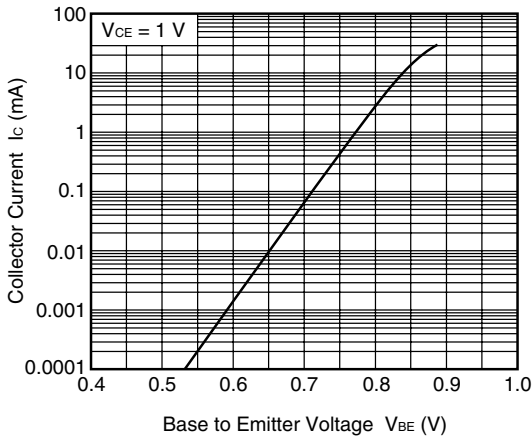
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



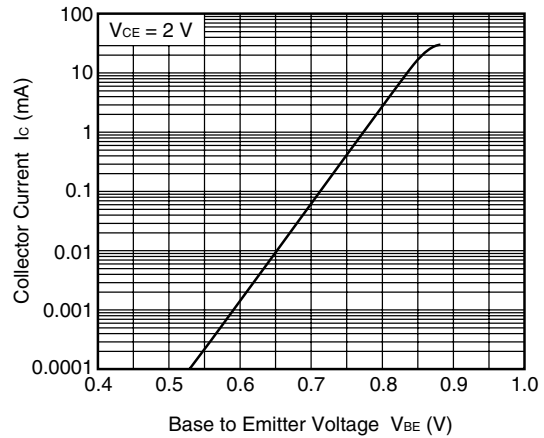
REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



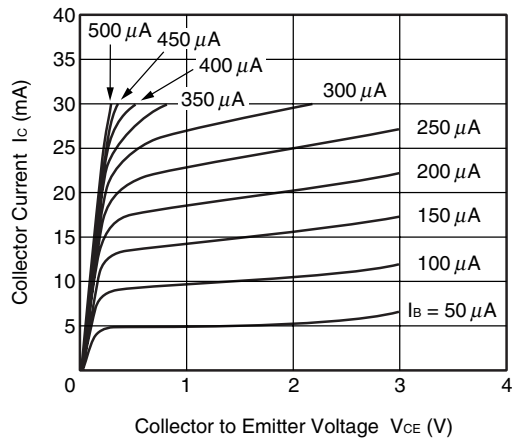
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE

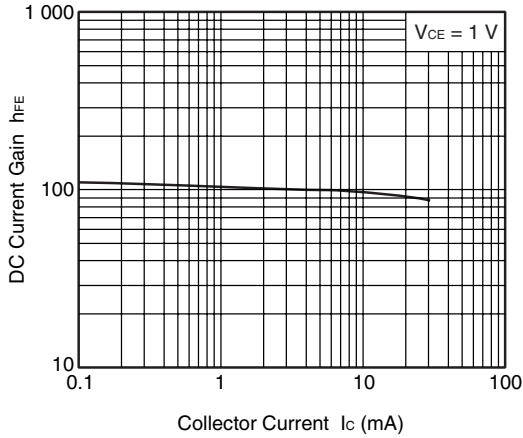


COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE

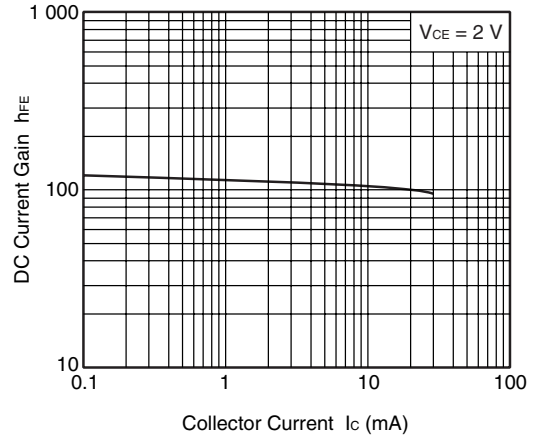


Remark The graphs indicate nominal characteristics.

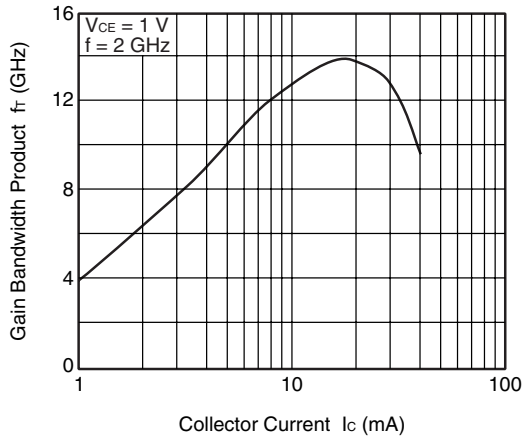
DC CURRENT GAIN vs. COLLECTOR CURRENT



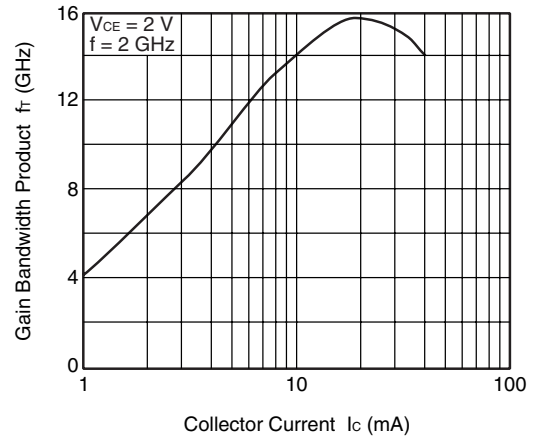
DC CURRENT GAIN vs. COLLECTOR CURRENT



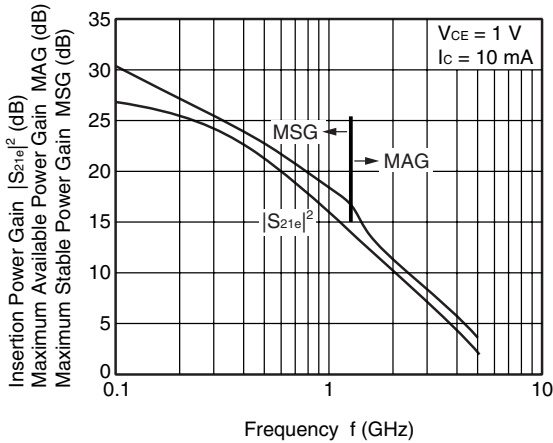
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



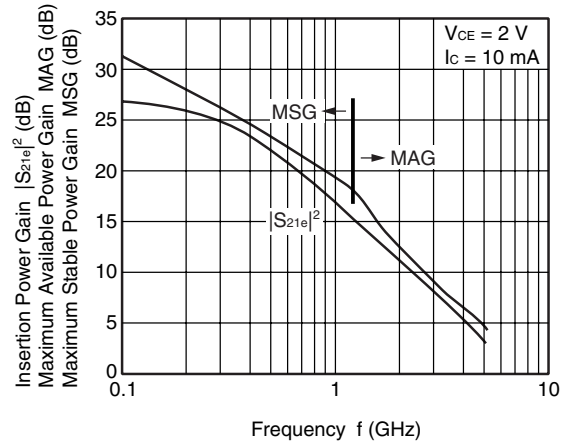
GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT



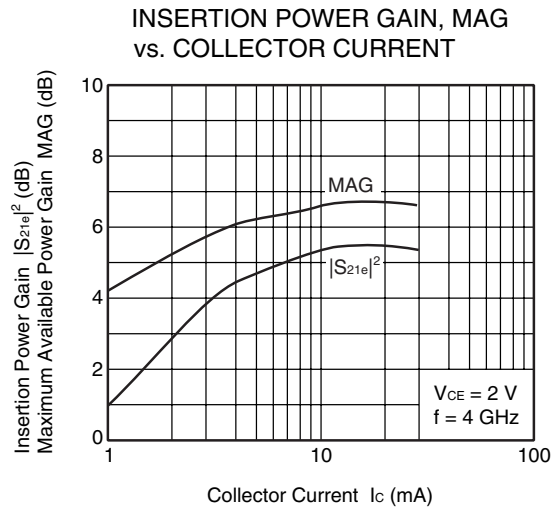
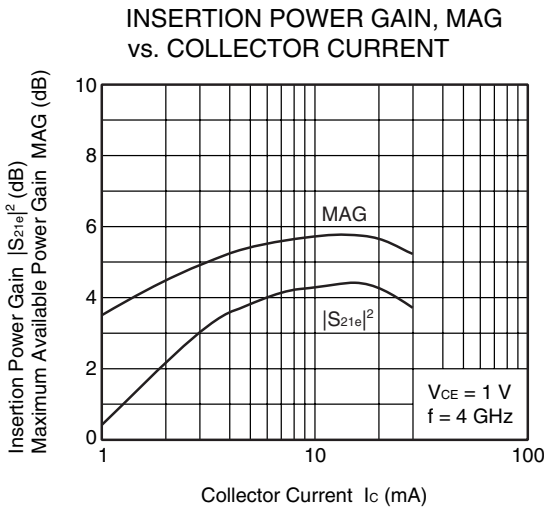
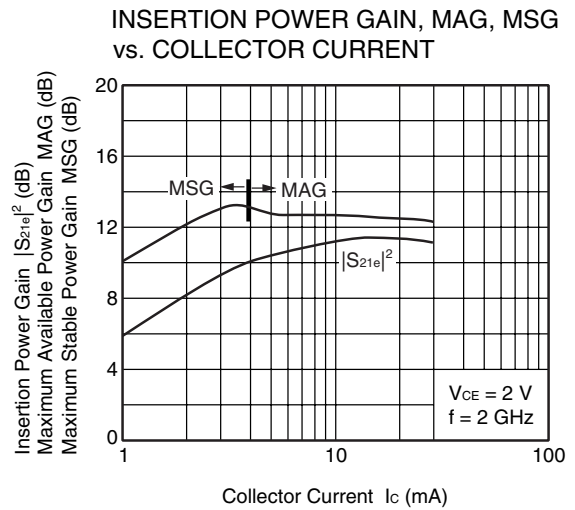
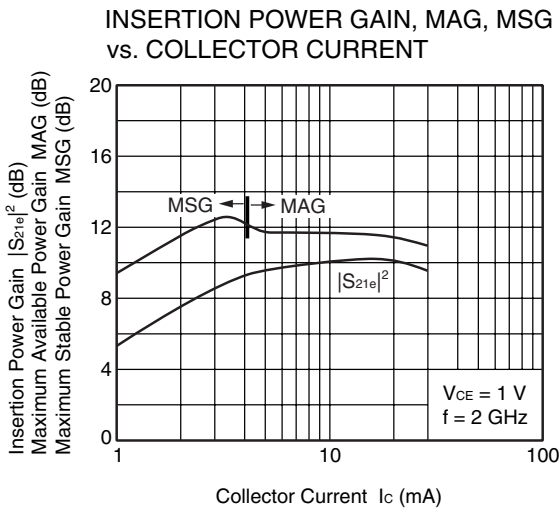
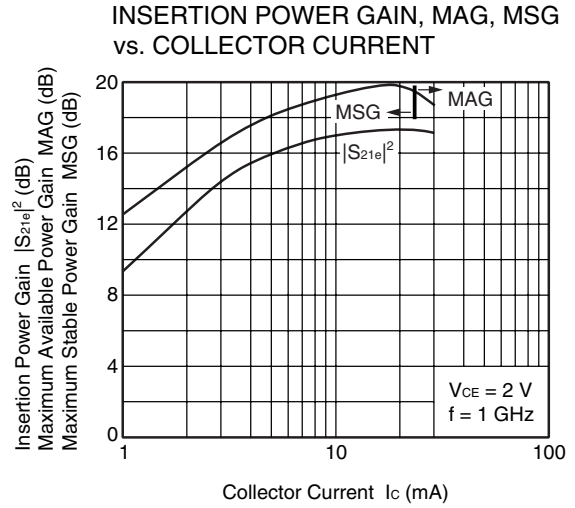
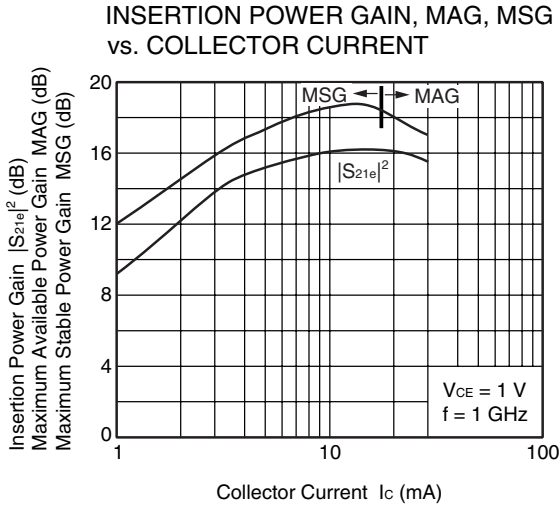
INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY



INSERTION POWER GAIN, MAG, MSG vs. FREQUENCY

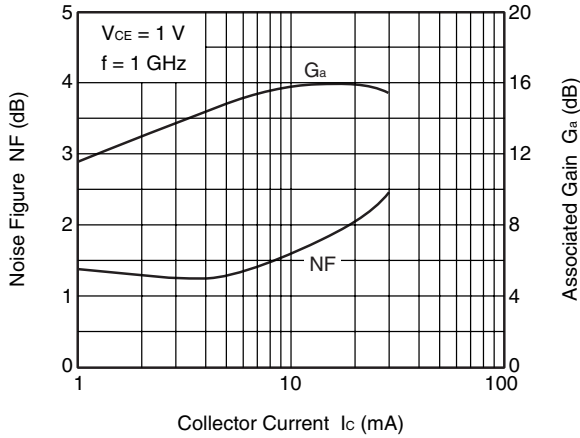


Remark The graphs indicate nominal characteristics.

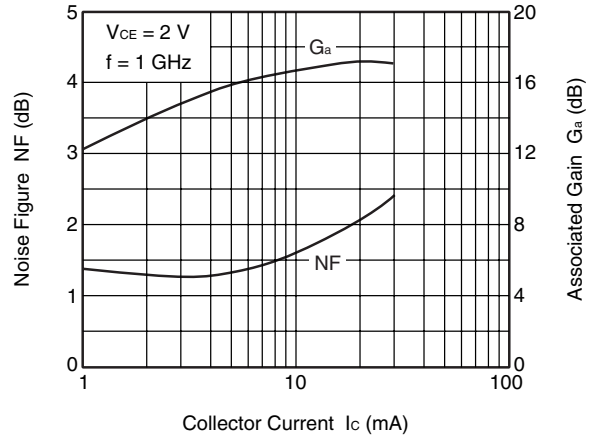


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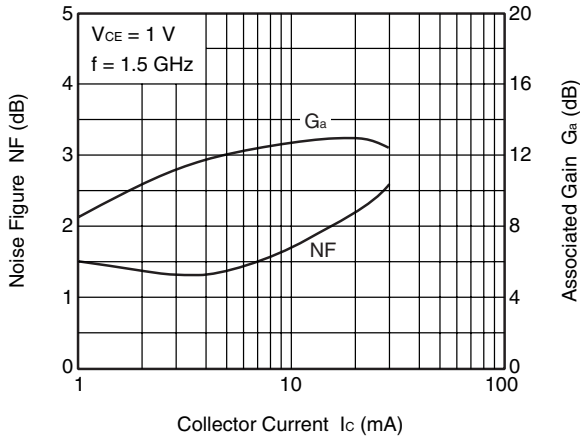
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



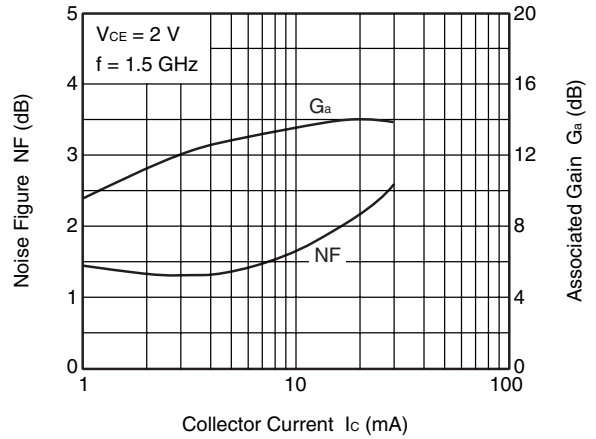
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



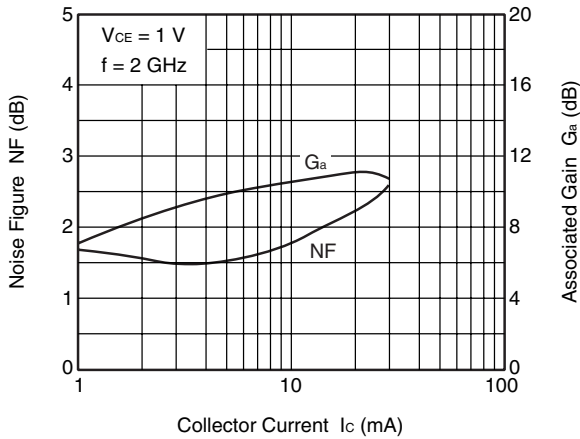
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



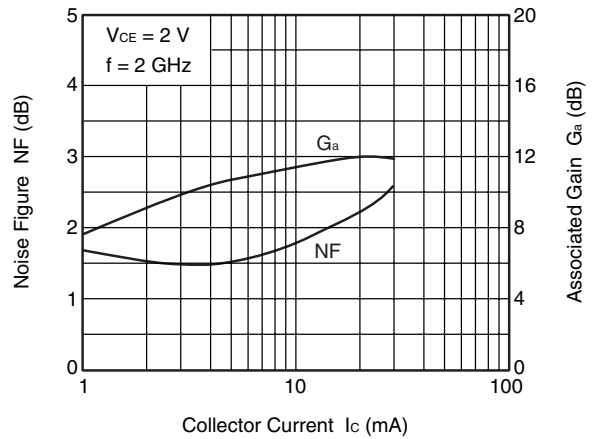
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



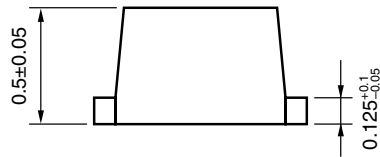
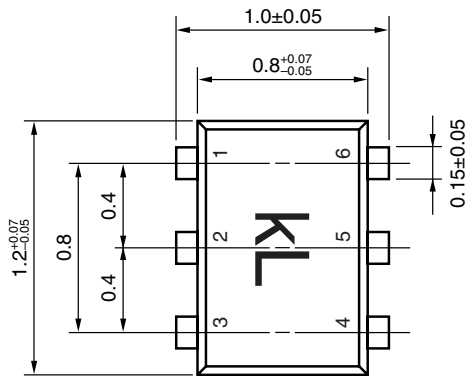
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



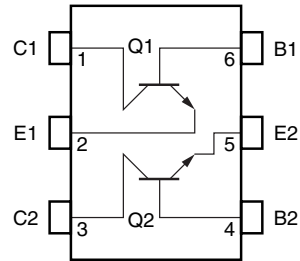
Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

6-PIN LEAD-LESS MINIMOLD (M16, 1208 PKG) (UNIT: mm)



(Top View)



PIN CONNECTIONS

- 1. Collector (Q1)
- 2. Emitter (Q1)
- 3. Collector (Q2)
- 4. Base (Q2)
- 5. Emitter (Q2)
- 6. Base (Q1)

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